

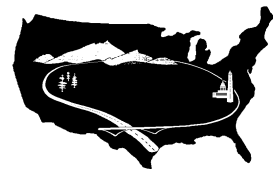


Flashing STOP/SLOW Paddle

February 1997

Prepared for
SHRP Implementation Program

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Problem

Night work, while maintaining traffic, has been limited on Federal Lands Highway Projects. Working at night can be beneficial to both motorists and contractors, because the traffic volumes are usually lower, which reduces the conflicts. However, night work under traffic presents unique considerations for safety. One such safety consideration is conspicuity of workers near traffic and especially flaggers controlling traffic. This is especially true for flaggers in remote areas when night construction under traffic is not anticipated.

One Strategic Highway Research Program product specifically designed for this situation is the Flashing STOP/SLOW Paddle. This report documents the evaluation of two devices on a construction project in Crater Lake National Park.

The construction project included extensive subgrade excavation which would have significantly impacted visitor traffic. To alleviate the traffic conflicts and accommodate the critical and extensive dig-outs, night time construction was implemented. This permitted the completion of the grading and paving within seasonal limitations. The overnight operations were scheduled from 3:00 p.m. to 10 a.m. during weekdays.

Evaluation

Approach

The practical application of the Flashing STOP/SLOW Paddle concept, specifically two alternative devices, was evaluated by soliciting the impressions of flaggers about the use of the devices and the motorist's reactions to the devices. On a typical National Park Service road improvement project in Crater Lake National Park, the contractor was required to complete the pavement dig-outs during the night, to reduce conflicts with the visitors. The work was required to be completed while maintaining traffic on the two lane two way roadway by flagging for a single lane traffic operation.

Two devices were provided to the contractor's flagger personnel for use during the night operations. One was the Strategic Highway Research Program's product, consisting of two battery operated high-intensity clear lens quartz halogen lamps mounted on a standard reflectorized sign paddle but only visible on the STOP side of the sign above and below the legend. The flagger activates the lights by pressing a button on the handle. The lights automatically flash ten times alternately over a short time after which their operation ceases. The power supply is a rechargeable system of D-cell batteries housed in the sign staff. The staff is aluminum, approximately 1.2 m in length with an integral switch mounted below the standard size paddle sign. The over all height is approximately 1.9 m. The device is considered light weight but is heavier than a typical non-lighted paddle.

The second device was an alternate design with reflective sheeting mounted on a high impact light weight corrugated plastic panel, having clear lens zeon strobe lights mounted on each side of the legend but visible from both sides of the sign. The support staff is approximately 1.4 m in length made of A.B.S. plastic in two threaded sections. The handle of the sign paddle extended about 725 mm, is threaded on to fit the staff, and

contained the power source and switch. Power is provided by two D-cell batteries and is controlled by a typical flashlight type on-off switch. Over all height using both staff sections is approximately 2.16 m.

The evaluation consisted of using these devices in typical construction operations to observe the traffic reaction, the performance of the devices, and the utility of the devices. The flaggers were requested to provide their impressions during interviews following routine operations. Every effort was made to avoid interruption of their flagging duties or to distract them with keeping notes or making measurements.

Criteria

To evaluate the effectiveness of using the Flashing STOP/SLOW Paddles the flaggers were interviewed about their impression on the following suggested criteria:

1. Conspicuity of sign paddles as demonstrated by reaction from motorists.
2. Control of the device, ease of operation.
3. Durability of the device.
4. Objections to the device.
5. Recommendations.

Description

The project consisted of reconstruction of the Upper Munson Valley Road, from the Park Headquarters to the Rim Drive, approximately 6.5 miles. Because of unsuitable subgrade there was considerable dig out of the surface, base and subgrade followed by reconstruction with suitable material and an asphalt surface pavement structure. This park road carries a mix of passenger cars, recreation vehicles and busses. The daily traffic volumes through the constructions operations exceeded 6,000 ADT. Traffic on the two lane two way rural road segment was considerably lower during the night construction periods. These construction operations using the Flashing STOP/SLOW Paddle continued from mid-summer to fall of 1996.

Findings

The impressions of the flaggers were that the motorists' attention was attracted by the flashing lights. However, the light was extremely intense and reportedly objectionable if operated too long or if too close to an observer. One device had a cycling feature, which, when the light was activated, caused ten flashes then automatically turned the lights off. Unfortunately, the operator, due to inadequate training, activated the switch in an attempt to shut off the light, which caused it to recycle and increased the time of intense light operation. On the other device, in which the lights showed through both sides of the sign

paddle, there was no automatic cycle, therefore the light could be turned off. This light, visible on both sides of the sign, was distracting to the flagger. The locations of the flaggers were illuminated by portable generators and flood lighting, but the intensity of the Flashing STOP/SLOW Paddles was considered overwhelming by some motorists.

Most motorists considered the conspicuity of the Flashing STOP/SLOW Paddle to be excellent. The reflectorized sheeting is supplemented when necessary by the flashing light activated by the flagger to draw the attention of motorists. Most motorists were observed to slow more gradually, and be more attentive to the flagger when the flashing light is activated. Many were inquisitive about the unfamiliar sign and responded to the flagger more attentively.

The devices were easy to operate and performed adequately. Although the devices are made of lightweight materials, the flaggers indicated the paddles were too heavy over extended periods of time. The flaggers indicated the sign staff was too short to permit them to comfortably look under the sign paddle. The overall size was considered unmanageable by the flaggers. The paddle dimensions are similar to, or slightly larger than, typical flagging paddles. The support staff is somewhat larger in circumference than typical unlighted paddle staffs.

The durability of the devices was variable and somewhat misleading in that the flaggers tended to treat them more carefully because they looked fragile. The one with metal components seemed more sturdy, but the protruding lights are vulnerable during transport and storage. The nonmetal device seemed less durable, because it seemed more susceptible to scratching and marring.

The objections to the devices were principally from the flaggers. They felt the weight was excessive, the size would be difficult to manage in wind, and the staff height was not adequate to see beneath.

The flaggers appreciated the flashing lights, but felt that alternative hand held lights, some of which pulsate, would do as well in alerting the drivers' attention to the flagger and be more versatile. The flaggers' perception is that the hand held lights would be more versatile and easier to manage in adverse conditions.

Costs

Costs were not one of the rating criteria. Costs were not a factor in this evaluation because the devices were borrowed from the Strategic Highway Research Program Work Zone Safety Showcase equipment trailer. The intent of this evaluation was to report on the reactions of the users and the motorists in a real life situation.

The purchase prices of Flashing STOP/SLOW Paddles range from two to ten times the cost of typical non-lighted paddles. There is an added cost of replacement batteries or for charging the rechargeable batteries. Because the technology is changing and the cost of these devices is variable by type, it would be necessary to consider costs at the time of implementation. With increased use and possible standardization, such as proposed requirements in the Manual of Uniform Traffic Control Devices, it is probable that the costs will change as the market stabilizes over time.

Conclusion

Based on the impressions of the flaggers, the Flashing STOP/SLOW Paddles are effective in attracting the attention of motorists. However, because of the increased weight, and difficulty in controlling the devices in adverse conditions, the devices were not endorsed. The devices have a distinct effect on motorists by drawing attention to the flagger, but other more suitable devices are available to supplement the standard STOP/SLOW paddle with highly visible flagger attire, and hand held devices that use illumination to attract the motorists' attention.

Based on this evaluation, the use of Flashing STOP/SLOW Paddles could be considered as an option for use under the following conditions

1. The stature of the flagger is adequate to control the device in adverse weather, and can endure the additional weight for the duration of the traffic control session.
2. The staff for supporting the paddle is of adequate height that the flagger can clearly see beneath the sign, so as not to obstruct the flaggers visibility.
3. The length of staff for supporting the paddle should accommodate other flagging devices, such as hand held radio for 2-way communications between flaggers when necessary. This is to allow a free hand for directional signals, while accommodating the flaggers needs for other associated equipment.